## IN THE SPECIFICATION

Please amend the paragraphs of the specification as follows:

On page 1, paragraph [0001]:

The present Application for Patent is a Continuation Application and claims priority to co-pending U.S. Application Serial No. 09/832,671, entitled "METHODS AND APPARATUS FOR POWER ALLOCATION ON A REVERSE LINK POWER CONTROL CHANNEL OF A COMMUNICATION SYSTEM," filed April 11, 2001, now ~~allowed~~ <u>US Patent No. 6,687,510, issued February 3, 2004</u>, and assigned to the assignee hereof and hereby expressly incorporated by reference herein, and which is a Continuation Application of U.S. Application Serial No. 09/267,565, entitled "METHODS AND APPARATUS FOR POWER ALLOCATION ON A REVERSE LINK POWER CONTROL CHANNEL OF A COMMUNICATION SYSTEM," filed March 12, 1999, <u>now abandoned,</u> and also assigned to the assignee hereof and hereby expressly incorporated by reference herein.

On page 3, paragraph [0009]:

Figure 1 shows the Forward Link 100 formatted in Code Channels 102. Two Code Channels [[102a]] <u>102A</u> and [[102b]] <u>102B</u> are explicitly shown in Figure 1. However, in accordance with the format shown in Figure 1, 32 Code Channels are provided on the Forward Link CDMA channel. Each Code Channel is divided into "Slots" 104. In a typical system, such as the one shown in Figure 1, each Slot 104 in the Forward Link has a predetermined duration. Each Slot is assigned to a particular remote station. In the system shown in Figure 1, each Slot comprises 2048 Chips." A Chip is defined as a duration in time that is equal to the duration of one bit of the code used to channelize the Code Channels. Each Slot 104 begins with a first data field 106 that is 464 Chips in length. A pilot field 108 follows the first data field 106. The pilot field is 96 chips in length. The pilot field 108, among other uses, allows the receiving device to synchronize to the phase of the incoming Forward Link signals (which include the pilot field 108 itself). A second data field 110 having a length of 464 Chips is then transmitted. A third data field 112 having a length of 400 Chips is transmitted next. Following the third data field 112, a power control field 114 is transmitted. The first power control field 114 has a length of 64

Chips. Next, a second pilot field 116 having a length of 96 Chips is transmitted, followed by a second power control field 118 having a length of 64 Chips. The last field in the Slot 104 is a fourth data field 120 having a length of 400 Chips.

On pages 4-5, paragraph [0012]:

However, determining the amount of power that is required by each RLPC Channel is difficult for some base stations from which transmission of RLPC information would be desirable. This can be understood from the following example. Figure 2 is an illustration of a system including three base stations 201, 203, and 205 and four remote stations ~~207a-207d~~ <u>207A-207D</u>. Each of remote stations ~~207a-207d~~ <u>207A-207D</u> typically maintains a list (commonly referred to as the "Active Set") of base stations from which the Forward Link 208 to that remote stations ~~207a, 207b, 207c, or 207d~~ <u>207A, 207B, 207C, or 207D</u> may originate. However, the Forward Link 208 will only originate from one of the base stations in the Active Set at any one time. The transmission paths 209 and 211 between those base stations 203 and 205, which are not transmitting the Forward Link 208 to the remote station [[207a]] <u>207A</u> typically has different loss characteristics than the transmission path 213 between the base station 201 that is transmitting the Forward Link 208 and the remote station [[207a]] <u>207A</u>. Since nothing is being transmitted to the remote station [[207a]] <u>207A</u> from the other base stations 203 and 205 in the Active Set, it is not possible to characterize the loss over the Forward Links 209 and 211 between the other base stations 203 and 205, and the remote station [[207a]] <u>207A</u>. Nonetheless, the remote station [[207a]] <u>207A</u> will be transmitting to the other base stations 203 and 205. Therefore, it is desirable to have each base station 201, 203, and 205 in the Active Set send reverse link power control information to the remote station [[207a]] <u>207A</u> so that the remote station will have information regarding the amount of power to send if selected to transmit.

On page 6, paragraph [0019]:

Figures [[3a-3c]] <u>3A-3C</u> describe the disclosed method and apparatus from the perspective of one base station.

On page 7, paragraph [0023]:

Figure 2 shows a communication system that includes seven stations 201, 203, 205, ~~207a, 207b, 207c, and 207d~~ 207A, 207B, 207C, and 207D. In accordance with one embodiment of the disclosed method and apparatus, the first, second and third stations 201, 203, and 205 are Base Stations. The fourth, fifth, sixth, and seventh stations ~~207a-207d~~ 207A-207D are Remote Stations (such as a wireless local loop telephone, a hand held telephone, a modem, a computer terminal, or another device or system used to originate information to be transmitted over the communication system). It should be understood that the number of Remote Stations is typically much greater than the number of Base Stations. However, only four Remote Stations ~~207a-207d~~ 207A-207D are shown in Figure 2 for the sake of simplicity. It should be understood that each station may be either a Remote Station or a Base Station, depending upon the type of communication system in which these stations are being used.

On page 7, paragraph [0025]:

In accordance with one embodiment of the disclosed method and apparatus, multiple Remote Stations concurrently transmit Data over the Reverse Link to one Base Station. This Data is transmitted from each Remote Station to a Base Station on a separate Code Channel. For example, the four Remote Stations ~~207a-207d~~ 207A-207D may each be transmitting information over the Reverse Link to the Base Station 201.

On page 8, paragraph [0027]:

Each Remote Station maintains a "Set" (or list) of "Active" Base Stations (i.e., an "Active Set"). A Base Station is placed in the Active Set if that Base Station is transmitting a Forward Link that is being received by the Remote Station 207 with at least a predetermined level of quality. In one embodiment, the quality of the Forward Link is determined by the quality of portions pilot 108 and pilot 116 of the Forward Link 100, referred to as the "Pilot Channel." A Pilot Channel is preferably made up of portions pilot 108 and pilot 116 of the Forward Link that are used by a Remote Station to determine the quality of the Forward Link and to determine the relative phase of the information being received by a Remote Station. In accordance with the embodiment of the disclosed method and apparatus shown in Figures 1 and

2, the Pilot Channel is transmitted on only one Code Channel [[102a]] <u>102A</u> from among the Code Channels [[102a]] <u>102A</u> and [[102b]] <u>102B</u> in the CDMA channel. Furthermore, the Pilot Channel is transmitted only during two pilot fields 108 and 116 of each Slot 104.

On page 9, paragraph [0030]:

Since the Remote Station only receives data from one of the Base Stations in the Active Set at any one time, the Remote Station selects one of the Base Stations in the Active Set to transmit data to the Remote Station. The selected Base Station 201 is preferably the Base Station 201 from which the Remote Stations ~~207a, 207b, 207c, or 207d~~ <u>207A, 207B, 207C, or 207D</u> receive the best quality Forward Link (i.e., the Base Station transmitting the Forward Link capable of supporting the highest data rate). In accordance with one embodiment of the disclosed method and apparatus, the rate at which the selected Base Station can reliably transmit Data to a particular Remote Station is communicated to the selected Base Station by the particular Remote Stations ~~207a, 207b, 207c, or 207d~~ <u>207A, 207B, 207C, or 207D</u> over the Reverse Link 213. The data rate is encoded with a unique code that indicates for which Base Station the data rate information is intended.

On pages 9-10, paragraph [0032]:

The selected Base Station determines the amount of power to allocate to a particular RLPC Channel based upon the quality of the Forward Link as determined by the Remote Station. In accordance with the embodiment shown in Figures 1 and 2, the Forward Link can support as many RLPC Channels as there are Code Channels [[102a]] <u>102A</u> and [[102b]] <u>102B</u>. Each such RLPC Channel is intended for a different Remote Station. The number of RLPC Channels to be transmitted by a Base Station is equal to the number of Remote Stations that include that Base Station in their Active Set. For example, if only three Remote Stations ~~207a, 207b, and 207c~~ <u>207A, 207B, and 207C</u> have a particular Base Station 201 in their Active Set, then the Base Station 201 transmits a Forward Link 208 that includes three RLPC Channels, one RLPC Channel intended for each of the three Remote Stations ~~207a, 207b, and 207c~~ <u>207A, 207B, and 207C</u> that include that Base Station in the Active Set.

On page 10, paragraph [0033]:

The Base Station also receives information over the Reverse Link from each of these three Remote Stations ~~207a, 207b, and 207c~~ 207A, 207B, and 207C. Accordingly, the receiving Base Station 201 must provide power control information to each of the three Remote Stations ~~207a, 207b, and 207c~~ 207A, 207B, and 207C. This information is provided in a power control message over the RLPC Channels. Each such RLPC Channel is transmitted over one Code Channel during the two power control fields 114 and 118 of each Slot. No power is allocated to the unused RLPC Channels (i.e., to the other Code Channels during the power control fields 114 and 118). Therefore, if the Forward Link uses a CDMA channel that includes 32 Code Channels, only three of the 32 Code Channels are required during the reverse link power control fields 114[[,]] and 118 (assuming that the Base Station is included in the Active Sets of only three Remote Stations). Accordingly, no power would be transmitted on the other 29 Code Channels of the Forward Link. This allows the maximum amount of power to be allocated to the three RLPC Channels that are directed to Remote Stations ~~207a, 207b, and 207c~~ 207A, 207B, and 207C that include the Base Station 201 in their Active Set. Each Remote Station ~~207a, 207b, and 207c~~ 207A, 207B, and 207C determines which particular power control message is intended for that Remote Station based upon the particular Code ~~Channels 102a or 102b~~ Channel 102A or 102B over which the message is sent (i.e., the particular Code ~~Channels 102a or 102b~~ Channel 102A or 102B that [[are]] is used to support the RLPC Channel).

On page 11, paragraph [0035]:

However, each Remote Station preferably only transmits information regarding the quality of one Forward Link. That is, a Remote Station only transmits information regarding the Forward Link between that Remote Station and the one Base Station that is currently selected by that Remote Station to transmit data to that Remote Station. For example, assume that the Active Set of the Remote Station [[207a]] 207A includes the three Base Stations 201, 203, and 205. Remote Station [[207a]] 207A transmits the data rate at which that Remote Station [[207a]] 207A can receive Data from the Base Station 201, assuming that the Forward Link between the Base Station 201 and the Remote Station [[207a]] 207A has a higher quality than the other two Forward Links 209 and 211. This data rate information can be used to determine the quality of

the Forward Link 208 (and so the quality of the RLPC Channel). However, while the Base Stations 203 and 205 receive the data rate information transmitted from the Remote Station [[207a]] 207A, the data rate information is only relevant to the Forward Link 208 between the select Base Station 201 and the Remote Station [[207a]] 207A. Therefore, the other Base Stations 203, 205 in the Active Set have no information about the current quality of the Forward Links 209, 211 between them and the Remote Station [[207a]] 207A.

On page 11, paragraph [0037]:

Figures [[3a - 3c]] 3A-3C are flowcharts of the steps performed in accordance with one disclosed method for determining the amount of power to allocate to each RLPC Channel. The method illustrated in Figures [[3a - 3c]] 3A-3C is performed independently by each Base Station in a communication system. The steps of Figures [[3a-3c]] 3A-3C are described below from the perspective of one Base Station 201.

On pages 11-12, paragraph [0038]:

For the purpose of this description, it will be assumed that the Base Station 201 is receiving Data from three Remote Stations ~~207a, 207b, and 207c~~ 207A, 207B, and 207C. In addition, it is assumed that the Active Set of these three Remote Stations ~~207a, 207b, and 207c~~ 207A, 207B, and 207C include the Base Station 201. The Base Station 201 receives "Data Rate Control" (DRC) messages over a Reverse Link 213 associated with the first Remote Station [[207a]] 207A. The Base Station 201 stores the received DRC messages in both a "Short List" and a "Long List." In accordance with one method, the Short List includes the five most recently received DRC messages and the Long List includes the twenty most recently received DRC messages. It should be understood that in one embodiment of the disclosed method and apparatus, the Long List includes the five DRC messages stored in the Short List. However, in an alternative embodiment, the Long List includes only those twenty DRC messages that were received before receipt of the five DRC messages stored in the Short List. In yet another alternative embodiment of the disclosed method and apparatus, any other number of DRC messages may be stored in the Long and Short Lists. However, it should be clear that the number of DRC messages stored in the Short List should be less than the number stored in the

Long List. Furthermore, it should be understood that the greater the number of messages stored, the lower the reliability of the information in the older stored messages due to the age of that information.

On page 12, paragraph [0039]:

The Base Station 201 makes a power control (PC) decision for each Remote Station. That is, the Base Station 201 determines whether the Remote Station [[207a]] <u>207A</u> is transmitting the Reverse Link with too much or too little power (STEP 301). In accordance with one disclosed method, this determination is based on the error rate of the Reverse Link 213. In another disclosed method, this determination is based upon a C/I measurement of the Reverse Link. Those skilled in the art will understand that there are many other ways in which the Base Station can determine whether the Remote Station has transmitted the information over the Reverse Link with an appropriate amount of power to be reliably received by the Base Station, but without using more power than is required. Accordingly, any known means may be used for making this determination in accordance with the disclosed method and apparatus.

On pages 12-13, paragraph [0040]:

If the power that is being sent on the Reverse Link 213 is appropriate, (STEP 302), then no power is allocated to the RLPC Channel associated with the Remote Station [[207a]] <u>207A</u> from which the Reverse Link 210 originated (STEP 304). The power is appropriate if the Base Station 201 determines that the power level of the Reverse [[link]] <u>Link</u> should not be adjusted. This condition is referred to as an Erasure. If the Base Station determines that the Remote Station is transmitting with either too little, or too much power, then a change in the amount of power is required on the Reverse Link 213 (i.e., an erasure does not occur) (STEP 302). In such a case, the Base Station 201 determines whether the most recently received data rate control message (i.e., the "Current" DRC message) is "Valid" from the Remote Station [[207a]] <u>207A</u>. A DRC is considered to be Valid if the DRC message content is received by the receiving Base Station with a predetermined level of assurance in the accuracy of the message content. The Base Station 207a also determines whether the Current DRC message is "Directed" to the Base Station 201 (STEP 306). The DRC message is Directed to a particular Base Station

if the DRC message provides information about the rate at which the transmitting Remote Station can receive information from that Base Station. The information may be provided in any manner, such as a measure of the quality of the Forward Link, or the actual data rate that can be supported by the Forward link. It should be noted that in accordance with one embodiment of the disclosed method and apparatus, each Remote Station transmits DRC messages at a predetermined rate. Each DRC message indicates the Remote Station from which the DRC message came. If a DRC message is Valid and Directed to the Base Station that receives that DRC message during a first period of time, then the DRC message is a relatively good indication of the quality of the Forward Link between the Remote Station that transmitted the DRC message and the Base Station that received the message. If a DRC message which is transmitted during a second time period is either not received as Valid by the Base Station 201, or is not directed to the Base Station 201, then there is no way to determine the quality of the Forward Link during that second period of time.

On page 13, paragraph [0041]:

Therefore, if the Current DRC message is Valid and Directed to the Base Station 201, then the Base Station 201 uses the content of that message to determine the quality (e.g., the C/I) of the Forward Link 208 (STEP 308). In accordance with one embodiment of the disclosed method and apparatus, the quality determination is based on the data rate that is being requested by the Remote Station [[207a]] <u>207A</u>. The Base Station 201 uses the inverse of the process used by the Remote Station [[207a]] <u>207A</u> to determine the data rate from the C/I of the Pilot Channel of the Forward Link 208. In addition, the Base Station 201 identifies the quality determination of the Forward Link 208 as being "Reliable" (STEP 308). The quality determination is identified as being Reliable due to the fact that the DRC message was both Valid and Directed to the Base Station 201.

On pages 13-14, paragraph [0042]:

Once the Base Station 201 has established a quality value for the Forward Link 208, the Base Station 201 checks whether the quality of the Forward Links 215 and 217 to each <u>of the</u> other Remote Stations [[207b]] <u>207B</u> and [[207c]] <u>207C</u> that include the ~~Remote~~ <u>Base</u> Station

201 in the Active Set has been determined (STEP 342) (see Figure 3c). As noted above, DRC messages are transmitted on each Reverse Link associated with a RLPC Channel. That is, DRC messages are transmitted by each of the three Remote Stations ~~207a, 207b, and 207c~~ 207A, 207B, and 207C that include the Base Station 201 in the Active Set. If the Base Station 201 has not yet determined the quality of all three Forward Links 208, 215, and 217, then the Base Station 201 continues the process at STEP 301 in order to determine the quality of the next Forward Link (STEP 344). Once the quality of each Forward Link 208, 215, and 217 associated with each RLPC Channel has been determined, the Base Station 201 allocates power to each RLPC Channel based on the quality determinations and the reliability of those determinations, as will be described in greater detail below.

On page 14, paragraph [0043]:

If the Current DRC message is either invalid or not Directed to the Base Station 201 (STEP 306), then in accordance with one embodiment of the disclosed method and apparatus, the Base Station gets the DRC messages stored on the Short List (STEP 310). A determination is made as to whether any of the most recent DRC messages were Directed to the Base Station 201 from the Remote Station [[207a]] 207A (STEP 312). If at least one Valid DRC message on the Short List is Directed to Base Station 201, then the Base Station 201 determines the quality (e.g., the C/I) of the Forward Link 208 based on the value of the most recent Valid DRC message directed to the Base Station 201 and stored in the Short List (STEP 314). As was the case in STEP 308, the Base Station 201 determines that the quality determination of the Forward Link is Reliable. This determination is made based on the results of STEP 312. However, in the case of STEP 314, the DRC message is not the Current DRC message. Therefore, in accordance with one embodiment of the disclosed method and apparatus, the quality value is adjusted to compensate for the fact that the DRC message is not Current.

On pages 14-15, paragraph [0044]:

For example, in the case in which quality is expressed as a C/I value, the C/I value is adjusted either up or down to compensate for the fact that the data rate information is not Current. In accordance with one embodiment, the C/I value associated with a Remote Station

from which no Current DRC message is available is adjusted to reflect a greater signal quality. The quality of the Forward Link will determine the amount of power allocated to the RLPC Channel. Signals transmitted over lower quality links are transmitted with more power, while signals transmitted over higher quality links are transmitted with less power. Therefore, adjusting the quality value to indicate a higher quality link results in less power being allocated to the RLPC Channel associated with the Remote Station [[207a]] 207A from which no Current DRC message directed to that Base Station is available. This results in more power being available for the RLPC Channel associated with the Remote Station from which the Base Station has received a Current DRC message directed to that Base Station.

On page 15, paragraph [0045]:

Alternatively, since the Base Station 201 has received a DRC message that was Directed to the Base Station 201 relatively recently (as indicated by the fact that such a message is on the Short List) the Base Station 201 may adjust the quality value downward. Such an adjustment would result in more power being allocated to the RLPC Channel associated with that Remote Station [[207a]] 207A. This is appropriate if there is a desire to increase the possibility that the RLPC Channel will be reliably received by the Remote Station [[207a]] 207A. As noted above, there is a limited amount of total power available to transmit all of the RLPC Channels. Therefore, increasing the amount of power with which a RLPC Channel is transmitted to one Remote Station decreases the amount of power that is available to transmit RLPC Channels to the other Remote Stations.

On page 16, paragraph [0052]:

Assuming that none of the DRC messages received by the Base Station 201 were Directed to that Base Station 201 (as determined in [[STEPs]] STEP 316 or 320), then the Base Station 201 determines whether the Current DRC message is Valid (STEP 324). If the Current DRC message is Valid, then the Base Station 201 establishes a quality value (such as a C/I value) for the Forward Link 208. One means by which that Base Station 201 establishes a quality value is by performing the inverse of the operation performed by the Remote Station [[207a]] 207A when that Remote Station [[207a]] 207A generated the Current DRC message.

The quality value is then modified to correct for the fact that the value is Unreliable. Alternatively, the value of the DRC message may be used directly (such as by reference to a lookup table) to determine the quality of the Forward Link 208.

On page 17, paragraph [0053]:

In one embodiment of the disclosed method and apparatus, the Base Station 201 takes into account that the Forward Link 209 from the Base Station 203 to which the DRC messages are currently Directed has the highest quality. That is, Base Stations 201 and 205 to which the Remote Station [[207a]] 207A has not Directed DRC messages will have a Forward Link that has a lower quality than the Forward Link transmitted from the Base Station 203 to which the Remote Station [[207a]] 207A is directing DRC messages. This is because the Remote Station [[207a]] 207A always directs the DRC message to the Base Station having the highest quality Forward Link.

On page 17, paragraph [0054]:

By performing the inverse of the operation performed by the Remote Station [[207a]] 207A to generate the DRC message, the Base Station 201 can determine the maximum quality of the Forward Link 208. Therefore, the Base Station 201 preferably determines that the quality of the Forward Link 208 is lower than the quality of the Forward Link 209, as determined from the value of the Current DRC message (STEP 326). However, this determination is considered to be Unreliable, since there is no way to know exactly how much lower the quality of the Forward Link 208 will be.

On page 17, paragraph [0055]:

In one embodiment of the disclosed method and apparatus, the Base Station 201 determines how much to adjust the quality of the Forward Link 208 by taking into account additional information. Examples of such information include: (1) a stored table that cross-references the location of the Remote Station [[207a]] 207A to the quality of the Forward Link 208, (2) historical information regarding the quality of the Forward Link 208, and (3) other information that is indicative of the magnitude of the difference between the quality of the

Forward Link 211 and 209 about which the information is relevant and the quality of the Forward Link 208 transmitted by the Base Station 201.

On page 19, paragraph [0063]:

In accordance with one embodiment of the disclosed method and apparatus, for Forward Link 208 for which the quality determination was considered to be Reliable, the C/I value will not be further adjusted to compensate for reliability. That is, the C/I value that will be used by the Base Station 201 will be essentially equal to the C/I value that was measured by the Remote Station [[207a]] <u>207A</u>. However, in accordance with an alternative embodiment of the disclosed method and apparatus, the C/I value will be modified by a factor which is a function of packet length, level of confidence on the prediction, fading margin, and other such factors that can affect the correlation between the value and the actual quality of the Forward Link 208.

On pages 21-22, paragraph [0072]:

In accordance with the disclosed method and apparatus, the antenna 402 receives Forward Link signals from one or more Base Stations. The signals are appropriately amplified, filtered and otherwise processed by the RF front end 404. The output from the RF front end 404 is then applied to the DSP 406. The DSP 406 decodes the received Forward Link signals. In addition, DSP 406 provides an indication as to the relative quality of the received Forward Link. The indication of relative quality is stored in the memory 410. The ~~General Purpose Processor~~ <u>general purpose processor</u> 408 is coupled to the DSP 406 and to the memory 410. The ~~General Purpose Processor~~ <u>general purpose processor</u> 408 reads the indications of relative quality from the memory 410 and determines the rate at which each received Forward Link can support data, and determines which Forward Link can support the highest data rate. Once the ~~General Purpose Processor~~ <u>general purpose processor</u> 408 has selected the Forward Link that can support the highest data rate, the ~~General Purpose Processor~~ <u>general purpose processor</u> 408 communicates the selection to the DSP 406. The DSP 406 encodes and modulates the information in a DRC, together with any information from the user interface 412, into a Reverse Link output signal that is provided to the RF front end 404. The RF front end processes the Reverse Link output signal

and couples the Reverse Link output signal to the antenna for transmission to each Base Station capable of receiving the signal.

On pages 22-23, paragraph [0075]:

The general purpose processor 508 then performs the process shown in Figures [[3a-3c]] <u>3A-3C</u>. The general purpose processor 508 communicates to the DSP 506 the amount of power that should be allocated to each RLPC Channel. Based upon the allocation of power to each RLPC Channel, the DSP 506 modulates and encodes the Forward Link signals to be transmitted by the Base Station 500. The signal is coupled to the RF front end 504. The RF front end couples the signal from the antenna 502 which transmits the Forward Link signal to the Remote Stations.

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